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What is claimed is:

1. A method of introducing biological material into cells, the method comprising:

providing one or more target cells; and

establishing a spray of substantially dispersed particles including at least biological material, the substantially dispersed particles having an electrical charge applied thereto such that one or more of the substantially dispersed particles of the spray is introduced into one or more of the target cells.

2. The method according to claim 1, wherein the step of establishing the spray of substantially dispersed particles includes dispensing a spray of microdroplets suspending particles, and further wherein the electrical charge is concentrated on the suspended particles as the microdroplet evaporates.

3. The method according to claim 2, wherein the suspended particles include carrier particles and biological material.

4. The method according to claim 3, wherein the microdroplets have a nominal diameter of about 10 nanometers to about 10 microns and the carrier particles have a nominal diameter of about 2 nanometers to about 1 micron.

5. The method according to claim 2, wherein the suspended particles are particles of biological material.

6. The method according to claim 2, wherein the step of dispensing the spray of microdroplets suspending particles includes creating a nonuniform electrical field between a dispensing tip from which the spray is established and an electrode electrically isolated from the dispensing tip.

7. The method according to claim 6, wherein the method further includes the step of directing the spray of substantially dispersed particles towards the one or more target cells using the electrode isolated from the dispensing tip.

8. The method according to claim 2, wherein a space charge effect of the concentrated electrical charge on the substantially dispersed particles of the spray enable one or more of the particles to be introduced into one or more of the target cells.

9. The method according to claim 8, wherein the electrical charge concentrated on a particular particle is in the range of about 80 percent to about 95 percent of a maximum charge that is held by the microdroplet suspending the particular particle.

10. The method according to claim 1, wherein the step of establishing a spray of substantially dispersed particles includes establishing a continuous spray of substantially dispersed particles.

11. The method according to claim 1, wherein the step of establishing a spray of substantially dispersed particles includes dispensing a spray of powdered biological material.

12. An apparatus for introducing biological material into one or more target cells, the apparatus comprising:

a biological material source including at least biological material; and

a dispensing device operably connected to the biological material source to receive at least biological material from the biological material source, wherein the dispensing device provides a spray of substantially dispersed particles of at least the biological material, and further wherein the spray of substantially dispersed particles has an electrical charge applied thereto such that one or more of the substantially dispersed particles of the spray is introduced into one or more of the target cells.

13. The apparatus according to claim 12, wherein the biological material source includes a suspension source, wherein the suspension source includes a suspension of at least biological material, and further wherein the dispensing device receives the suspension and dispenses a spray of microdroplets suspending particles including biological material.

14. The apparatus according to claim 13, wherein the suspension includes carrier particles and biological material.

15. The apparatus according to claim 14, wherein the microdroplets have a nominal diameter of about 10 nanometers to about 10 microns and the carrier particles have a nominal diameter of about 2 nanometers to about 1 micron.

16. The apparatus according to claim 13, wherein the suspended particles are particles of biological material.

17. The apparatus according to claim 13, wherein the dispensing device receives the suspension and dispenses a continuous spray of dispersed particles.

18. The apparatus according to claim 13, wherein the dispensing device includes:

a dispensing tip from which the spray of microdroplets suspending particles is dispensed; and

an electrode isolated from the dispensing tip, wherein a nonuniform electrical field is created between the dispensing tip and the electrode.

19. The apparatus according to claim 18, wherein the electrode is located at a position relative to the dispensing tip to direct the spray of substantially dispersed particles towards the one or more target cells.

20. The apparatus according to claim 19, wherein the electrode is a ring electrode having a diameter greater than a diameter of a spray orifice of the dispensing tip and positioned such that the center of the ring electrode coincides with a longitudinal axis extending through the spray orifice.

21. The apparatus according to claim 19, wherein the electrode is a conductive target including one or more cells associated therewith positioned forward of the spray orifice, the conductive target having a surface area greater than a cross section area taken perpendicular to a longitudinal axis extending through the spray orifice.

22. The apparatus according to claim 12, wherein the apparatus further includes a vacuum chamber in which the one or more target cells are located, and further wherein the dispensing device provides the spray of substantially dispersed particles into the vacuum chamber.

23. The apparatus according to claim 12, wherein the apparatus further includes a target including the one or more target cells, and further wherein the target is positioned relative to the dispensing device for allowing introduction of one or more of the particles into one or more of the target cells.

24. The apparatus according to claim 23, wherein at least one of the target and the dispensing device are movable relative to the other.

25. The apparatus according to claim 24, wherein the target is a continuously movable surface having one or more cells thereon, and further wherein the movable surface moves relative to the dispensing device such that one or more different cells are continuously moved past the spray of substantially dispersed particles.

26. The apparatus according to claim 24, wherein the target is a rotatable surface for placement of cells thereon, and further wherein the dispensing device is movable in a plane parallel to the rotatable surface.

27. The apparatus according to claim 23, further including means for adjusting a distance between the dispensing device and the target.

28. The apparatus according to claim 23, wherein the apparatus further comprises a member positioned between the dispensing device and the target, and further wherein the member includes an opening such that only a portion of the spray of particles is allowed through the opening for contact with one or more of the target cells.

29. The apparatus according to claim 12, wherein the apparatus further comprises one or more electrodes positioned about a volume into which the spray is dispensed for accelerating the spray of particles towards the target.

30. An apparatus for introducing biological material into target cells, the apparatus comprising:

a biological material source including a suspension of at least biological material;

a capillary tube electrode, wherein the capillary tube electrode includes a capillary tube having a first open end and a second open end, the capillary tube operatively connected to the biological material source to receive a flow of the suspension of at least biological material at the first open end thereof; and

an electrode isolated from but positioned in proximity to the second open end of the capillary tube, wherein a nonuniform electrical field is created between the capillary tube electrode and the electrode such that a spray of microdroplets suspending particles of at least biological material is provided from the second end of the capillary tube, and further wherein upon evaporation of the microdroplets an

electrical charge is concentrated on the suspended particles resulting in a charged spray of substantially dispersed particles such that one or more of the substantially dispersed particles of the spray is introduced into one or more of the target cells.

31. The apparatus according to claim 30, wherein the suspended particles include carrier particles having biological material associated with such carrier particles.

32. The apparatus according to claim 30, wherein the suspended particles are particles of biological material.

33. The apparatus according to claim 30, wherein the biological material source provides a continuous source of biological material to the capillary tube.

34. The apparatus according to claim 30, wherein the electrode is located at a position relative to the second open end of the capillary tube to direct the spray of substantially dispersed particles towards the target cells.

35. The apparatus according to claim 34, wherein the electrode is a ring electrode having a diameter greater than a diameter of the capillary tube and positioned such that an axis through the center of the ring electrode coincides with an axis extending through the capillary tube.

36. The apparatus according to claim 34, wherein the electrode is a conductive target including one or more cells associated therewith positioned forward of the second open end of the capillary tube, the conductive target having a surface area greater than a cross section area of the capillary tube taken perpendicular to a longitudinal axis extending through the capillary tube.

37. The apparatus according to claim 30, wherein the capillary tube electrode further includes a casing concentric with at least a portion of the capillary tube

between the first and second open ends thereof, the second open end of the capillary tube extending beyond the casing a predetermined distance, and further wherein the apparatus includes a gas source providing a gas to be received between the capillary tube and the concentric casing.

38. The apparatus according to claim 37, wherein capillary tube electrode further includes an additional capillary tube concentric with at least a portion of the capillary tube and positioned between the casing and the capillary tube.

39. The apparatus according to claim 38, wherein the apparatus further includes a solution source to provide a solution to be received between the additional capillary tube and the capillary tube.

40. An apparatus for introducing biological material into target cells, the apparatus comprising:

a biological material source including a suspension of at least biological material;

an electrolyte source for providing a solution;

a capillary tube electrode having a dispensing tip, wherein the capillary tube electrode includes:

a first capillary tube having a first open end and a second open end, the first capillary tube operatively connected to the biological material source to receive a flow of the suspension of at least biological material at the first open end thereof, and

a second capillary tube concentric with at least a portion of the first capillary tube, wherein the electrolyte solution is received in an annular opening defined between the first and second concentric capillary tubes; and

an electrode isolated from but positioned in proximity to the dispensing tip of the capillary tube electrode, wherein a nonuniform electrical field is created between the capillary tube electrode and the electrode such that a spray of microdroplets

suspending particles of at least biological material is provided from the dispensing tip, and further wherein upon evaporation of the microdroplets an electrical charge is concentrated on the suspended particles resulting in a charged spray of substantially dispersed particles.

41. The apparatus according to claim 40, wherein the suspended particles include carrier particles and biological material.

42. The apparatus according to claim 40, wherein the suspended particles are particles of biological material.

43. The apparatus according to claim 40, wherein the biological material source provides a continuous source of at least biological material to the first open end of the first capillary tube.

44. The apparatus according to claim 40, wherein the electrode is located at a position relative to the dispensing tip of the capillary tube electrode to direct the spray of substantially dispersed particles towards the target cells.

45. The apparatus according to claim 44, wherein the electrode is a ring electrode having a diameter greater than a diameter of the first or second capillary tube and positioned such that an axis through the center of the ring electrode coincides with a longitudinal axis extending through the first capillary tube.

46. The apparatus according to claim 44, wherein the electrode is a conductive target associated with one or more cells, wherein the conductive target is positioned forward of the dispensing tip of the capillary tube electrode, and further wherein the conductive target has a surface area greater than a cross section area of the first or second capillary tube taken perpendicular to a longitudinal axis extending therethrough.

47. The apparatus according to claim 44, wherein the capillary tube electrode further includes a casing concentric with at least a portion of the second capillary tube between a first and second open end thereof, the second open end of the second capillary tube extending beyond the casing a predetermined distance, and further wherein the apparatus includes a gas source providing a gas to be received between the second capillary tube and the concentric casing.

48. A method for introducing biological material into cells, the method comprising:

providing one or more target cells;

providing a first flow of a suspension including at least biological material;

providing a second flow of a solution; and

establishing a spray of substantially dispersed particles including at least biological material from the first flow and the second flow, the substantially dispersed particles having an electrical charge applied thereto such that one or more of the substantially dispersed particles of the spray is introduced into one or more of the target cells.

49. The method according to claim 48, wherein the step of establishing the spray of substantially dispersed particles includes dispensing a spray of microdroplets suspending particles, and further wherein the electrical charge is concentrated on the suspended particles as the microdroplet evaporates.

50. The method according to claim 49, wherein the suspended particles include carrier particles and biological material.

51. The method according to claim 49, wherein the suspended particles consist essentially of biological material.

52. The method according to claim 48, wherein the solution includes an agent for promoting penetration of the target cells.

53. The method according to claim 48, wherein the solution includes an electrolyte solution having a predetermined electrical conductivity.

54. A method of coating particles, the method comprising:

providing at least one opening at a spray dispenser end;

providing a flow comprising at least one liquid suspension through the at least one opening, wherein the flow comprising the at least one liquid suspension comprises at least particles and a coating material;

establishing from at least the one liquid suspension a spray of microdroplets suspending at least the particles forward of the spray dispenser end by creating a nonuniform electrical field between the spray dispenser end and an electrode electrically isolated therefrom, wherein the particles are coated with at least a portion of the coating material as the microdroplet evaporates.

55. The method of claim 54, wherein the particles comprise carrier particles and the coating material comprises biological material.

56. The method of claim 54, wherein the at least one suspension comprises biological material particles.

57. The method of claim 56, wherein the coating material comprises a facilitating transfer material.

58. The method of claim 54, wherein establishing a spray of microdroplets comprises concentrating electrical charge on the coated particles as the microdroplet evaporates, and further wherein a space charge effect of the concentrated electrical charge substantially prevents agglomeration of the coated particles.

59. The method of claim 58, wherein the electrical charge concentrated on a coated particle is in the range of about 80 percent to about 95 percent of a maximum charge that is held by the microdroplet.

60. The method of claim 54, wherein the particles have a nominal diameter of

about 2 nanometers to about 1 micron.

61. The method of claim 60, wherein the particles have a nominal diameter of about 10 nanometers to about 100 nanometers.

62. The method of claim 54, wherein the microdroplets have a nominal diameter of about 10 nanometers to about 10 microns and the particles have a nominal diameter of about 2 nanometers to about 1 micron.

63. The method of claim 54, wherein establishing the spray of microdroplets comprises establishing a continuous spray of coated particles.

64. The method of claim 54, wherein providing at least one opening at a spray dispenser end comprises providing at least two openings at the spray dispenser end, and further wherein flowing at least one liquid suspension comprising particles and a coating material through the opening comprises:

flowing a liquid suspension comprising particles through a first opening at the spray dispenser end; and

flowing a liquid suspension comprising coating material through a second opening at the spray dispenser end.

65. The method of claim 54, wherein the method further comprises controlling the amount of coating material in the microdroplets of the spray.

66. A method for coating particles, the method comprising:

providing a first flow of a suspension comprising at least particles, wherein the particles have a nominal diameter of about 2 nanometers to about 1 micron;

providing a second flow of a solution comprising a coating material; and

establishing a spray of substantially dispersed coated particles comprising separated particles of the first flow encapsulated by coating material of the second

flow, the substantially dispersed coated particles having an electrical charge applied thereto such that a space charge effect resulting from repulsion of the electrically charged substantially dispersed coated particles is used to prevent agglomeration of the one or more substantially dispersed coated particles of the spray.

67. The method of claim 66, wherein the particles have a nominal diameter of about 10 nanometers to about 100 nanometers.

68. The method of claim 66, wherein establishing the spray of substantially dispersed coated particles comprises dispensing a spray of microdroplets suspending one or more particles, and further wherein the one or more particles are coated with at least a portion of the coating material and the electrical charge is concentrated on the coated particles as the microdroplets evaporates.

69. The method of claim 68, wherein the method further comprises controlling the amount of coating material in the microdroplets of the spray.

70. The method of claim 68, wherein the electrical charge concentrated on a coated particle is in the range of about 80 percent to about 95 percent of a maximum charge that is held by the microdroplet.

71. An apparatus for use in coating particles, the apparatus comprising:

at least one source comprising at least one liquid suspension, wherein the at least one source comprising the at least one liquid suspension comprises at least particles and a coating material;

a spray dispenser, wherein at least one opening is defined at an end of the spray dispenser for providing a flow of the at least one liquid suspension;

an electrode electrically isolated from but positioned in proximity to the spray dispenser end, wherein a nonuniform electrical field is created between the spray dispenser end and the electrode electrically isolated therefrom to establish a

spray of microdroplets suspending at least the particles forward of the spray dispenser end when the flow of the at least one liquid suspension is provided, wherein the particles are coated with at least a portion of the coating material as the microdroplets evaporate.

72. The apparatus of claim 71, wherein the particles comprise carrier particles and the coating material comprises biological material.

73. The apparatus of claim 71, wherein the at least one suspension comprises biological material particles.

74. The apparatus of claim 73, wherein the coating material comprises a facilitating transfer material.

75. The apparatus of claim 71, wherein the particles have a nominal diameter of about 2 nanometers to about 1 micron.

76. The apparatus of claim 75, wherein the particles have a nominal diameter of about 10 nanometers to about 100 nanometers.

77. The apparatus of claim 71, wherein the microdroplets have a nominal diameter of about 10 nanometers to about 10 microns and the particles have a nominal diameter of about 2 nanometers to about 1 micron.

78. The apparatus of claim 71, wherein the at least one opening at a spray dispenser end comprises at least two openings at the spray dispenser end, wherein the at least one liquid suspension comprises a liquid suspension comprising particles and a liquid suspension comprising coating material, and further wherein a first opening of the at least two openings at the spray dispenser end is used to provide a flow of the liquid suspension comprising particles and a second opening of the at

least two openings at the spray dispenser end is used to provide a flow of the liquid suspension comprising coating material.

79. The apparatus of claim 71, wherein the apparatus further includes a vacuum chamber, and further wherein the spray of microdroplets is provided into the vacuum chamber.

80. The apparatus of claim 71, wherein the apparatus further comprises a movable surface continuously moved past the spray of microdroplets.

81. An apparatus for coating particles, the apparatus comprising:

a source comprising at least one suspension, wherein the source comprising the at least one suspension comprises at least particles and coating material;

a capillary tube electrode, wherein the capillary tube electrode includes a capillary tube having a first open end and a second open end, the capillary tube operatively connected to the source to receive a flow of at least the suspension at the first open end thereof; and

an electrode isolated from but positioned in proximity to the second open end of the capillary tube, wherein a nonuniform electrical field is created between the capillary tube electrode and the electrode isolated therefrom such that a spray of microdroplets suspending at least the particles is provided from the second end of the capillary tube, and further wherein the particles are coated with at least a portion of the coating material as the microdroplet evaporates.

82. The apparatus of claim 81, wherein the particles comprise carrier particles and the coating material comprises biological material.

83. The apparatus of claim 81, wherein the particles comprise biological material particles.

84. The apparatus of claim 83, wherein the coating material comprises a facilitating transfer material.

85. The apparatus of claim 81, wherein an electrical charge is concentrated on the coated particles as the microdroplet evaporates, and further wherein a space charge effect of the concentrated electrical charge substantially prevents agglomeration of the coated particles.

86. The apparatus of claim 85, wherein the electrical charge concentrated on a coated particle is in the range of about 80 percent to about 95 percent of a maximum charge that is held by the microdroplet.

87. The apparatus of claim 81, wherein the particles have a nominal diameter of about 2 nanometers to about 1 micron.

88. The apparatus of claim 87, wherein the particles have a nominal diameter of about 10 nanometers to about 100 nanometers.

89. The apparatus of claim 81, wherein the particle source provides a continuous source of the suspension to the capillary tube.

90. The apparatus of claim 81, wherein the capillary tube electrode further comprises a casing concentric with at least a portion of the capillary tube between the first and second open ends thereof, the second open end of the capillary tube extending beyond the casing a predetermined distance, and further wherein the apparatus includes a gas source providing a gas to be received between the capillary tube and the concentric casing.

91. An apparatus for coating particles, the apparatus comprising:

a particle source comprising at least particles to be coated;

a coating material source comprising at least coating material;

a capillary tube electrode having a dispensing tip, wherein the capillary tube electrode includes:

a first capillary tube having a first open end and a second open end, the first capillary tube operatively connected to receive a flow of at least one of particles and coating material at the first open end thereof, and

a second capillary tube concentric with at least a portion of the first capillary tube, wherein at least one of the particles and the coating material is received in an annular opening defined between the first and second concentric capillary tubes; and

an electrode isolated from but positioned in proximity to the dispensing tip of the capillary tube electrode, wherein a nonuniform electrical field is created between the capillary tube electrode and the electrode such that a spray of microdroplets suspending at least particles is provided from the dispensing tip, and further wherein upon evaporation of the microdroplets the particles are coated with the coating material.

92. The apparatus of claim 91, wherein the capillary tube electrode further includes a casing concentric with at least a portion of the second capillary tube between a first and second open end thereof, the second open end of the second capillary tube extending beyond the casing a predetermined distance, and further wherein the apparatus includes a gas source providing a gas to be received between the second capillary tube and the concentric casing.

93. The apparatus of claim 91, wherein an electrical charge is concentrated on the coated particles as the microdroplet evaporates, and further wherein a space charge effect of the concentrated electrical charge substantially prevents agglomeration of the coated particles.

94. The apparatus of claim 93, wherein the electrical charge concentrated on a

coated particle is in the range of about 80 percent to about 95 percent of a maximum charge that is held by the microdroplet.

95. The apparatus of claim 91, wherein the particles have a nominal diameter of about 2 nanometers to about 1 micron.

96. The apparatus of claim 95, wherein the particles have a nominal diameter of about 10 nanometers to about 100 nanometers.

97. The apparatus of claim 91, wherein the particle source comprises at least one suspension comprising biological material particles.

98. The apparatus of claim 91, wherein the particle source comprises biological material particles.

99. The apparatus of claim 91, wherein the coating material comprises a facilitating transfer material.